

**Government-to-Business Electronic Services:  
Understanding and Driving Adoption of Online Transactions \***

by

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## **Abstract**

*Advancing e-government requires governments to move beyond information services to provide more online transactions to citizens and businesses. Businesses, while less studied, are both the main target of advanced transactional online services and the main source of revenue for e-government portals. This study examines the factors affecting businesses' intention to conduct electronic transactions with government. It utilizes the literature on technology acceptance model and innovation adoption research to develop hypotheses. We test the hypothesized relationships with a sample of a state-wide survey of businesses with regard to specific online transactional services. The results of logistic regressions suggest that perceived benefits and trust are positively associated with the intention to adopt. Firm capacity has only a weak relationship with adoption intention. To increase adoption, managers of electronic government services may wish to further streamline services online to increase the benefits to businesses. Attention to the protection of business information submitted during the transaction is also important.*

## **INTRODUCTION**

Electronic government has become an increasingly important issue at all levels of government with the prevalent use of information and communication technologies in government operation. This is in part a response to growing expectation of citizens and businesses on getting information and services electronically. Deployment of information technology is also viewed as a way to meet service demand with shrinking resources.

Electronic government (e-government) is the use of information and communication technologies to enhance the relations between government and all stakeholder groups for the delivery of public information and services as well as participation in public governance. The customers of these electronic services go beyond citizens to include businesses, nonprofit organizations, government employees, and other governments (U.S. GAO, 2001, p. 1).

Among these stakeholder groups, the primary focus of the existing research on e-government has been on citizens. One group of studies examines citizens' access and use

of government information and services online (Graafland-Essers & Etedgui, 2003; Horrigan, 2004; Thomas & Streib, 2003). Another group of studies surveys the electronic services available on government Web sites for citizens to use (Norris, 2003; Norris & Moon, 2005; West, 2004).

However, businesses, as the primary target of many interactive electronic services offered by government, are less studied. Examples of interactive services include online reporting and submission of corporate information, permitting, licensing, and tax filing. These interactive services are considered more advanced electronic services according to a variety of the stage models of electronic government development (Ho, 2002; Layne & Lee, 2001; Moon, 2002). Since e-government seems to reach a stage of stagnation due to increasing difficulty in moving to the next stage (Norris & Moon, 2005), it is important to understand how more advanced services can be developed and implemented.

Moreover, businesses are important because they constitute a major source of revenue for the financing of e-government projects. It is particularly the case for over twenty state governments that adopted the self-funding model to finance information and transaction services on their Web sites. In this self-funding model, the sale of vehicle information is the main source of revenue.<sup>1</sup> State governments divert a portion of this fund to finance online information and services for citizens that are usually free or only cost a nominal fee.

This paper attempts to fill the gap in the understanding of government-to-business electronic services. The emphasis is on future adoption of online e-government transactions by businesses. This study moves beyond descriptive studies by drawing from theories and by employing rigorous data collection and analysis. Moreover, it tests

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<sup>1</sup> See Stefan Haid, German University of Administrative Sciences-Speyer, dissertation, forthcoming.

theories and prescribes policy recommendations for advancing e-government to the next stage.

The next section is a brief review of literature on adoption of e-government information and services, from which we develop key factors for adoption and generation of testable hypotheses. Next is the methods and data section that lays out data collection as well as variables and their operationalization. Findings and discussions follow. The concluding section brings together the theoretical and practical implications of the findings and suggests areas of future research.

## **RESEARCH ON THE ADOPTION OF E-GOVERNMENT SERVICES**

### ***Online Service Adoption by Government***

Much scholarly research examines government adoption of online information and services. The perspective centers on government and examination of government Web sites is the primary method of data collection. Ho (2002) studies city Web sites to understand adoption of online information and services from the innovation and reform perspective. He concludes that many Web sites still focus on information and are at the early stage of e-government development; he argues that it is important to move to more integrated information and services with more transactions and interactions.

For local governments, Holden et al. (2003) and Norris & Moon (2005) also track adoption of online information and services. If progress is solely measured by Web site deployment, local governments have made significant progress. However, as far as transactional information and services such as payment of utility bills, voter registration, and delivery of government records are concerned, these local governments have made rather slow progress.

West's (2004) study looks at state and federal government Web sites to see what information and services have been adopted by these governments to serve citizens. Although there are more online information and services available at high levels of government, they also lack transactional services. Only slow progress has been made in providing transactional services online. For example, West (2004, p.20) reports that the percentage of federal and state Web sites that have online services moved from 22 in 2000 to 25 in 2001.

### ***Online Service Adoption by Citizens***

In comparison, citizen adoption of electronic government services receives relatively less scholarly attention. Most of the studies are descriptive. For the last four years, the Pew Internet and American Life project conducted two national surveys to understand citizen use of e-government information and services. The first one conducted in 2001 reveals that 68 million American adults have used government agency Web site (Larsen & Rainie, 2002). A study conducted two years later shows a 50 percent increase to 97 million American adults that have experience with government agency Web site (Horriagan, 2004). About three quarters of citizens use government Web sites for getting information on recreation, work or school-related research, and downloading forms from government (Larsen & Rainie, 2002, p. 3). The percentage of citizens using transactional services is relatively low. For example, online renewal of driver licenses and recreational licenses are at 12 and 4 percent, respectively.

More sophisticated scholarly works usually focus on issues of digital divide. Thomas & Streib (2003) surveyed residents of the State of Georgia and found that users of government Web sites have higher incomes, and are less likely to be minorities, rural

residents, or young. The national study by Mossberger and her colleagues (2003) limited its scope of e-government to getting information. The results are similar to those of Thomas & Streib (2003). Carter & Belanger (2004) have given a theoretically sophisticated treatment of citizen adoption of e-government information and services. However, the sample of 140 undergraduate students at a Southeast university limits its ability to generalize to the broader population.

### ***Gaps of Existing Research***

The existing research effort to understand the adoption of e-government tends to be from a governmental point of view. Relatively few studies take the citizen perspective in understanding individuals' adoption decisions. One of the main criticisms of current e-government concerns the top-down bias impacting decisions on what type and nature of information and services are to be provided (McNeal et al., 2003). Thus, e-government either ignores the citizen's perspective altogether or misunderstands it, due to the lack of convenient methods for citizens to voice their concerns. Since government and citizens can hold different views with regard to electronic services (Moon & Welch, 2004), it is important to understand adoption from the perspective of customers (citizens).

Most of the surveys on citizens are descriptive in nature and present only frequency distribution information. The lack of methodological rigor in research design and data analysis limits their ability to discern the relative importance of various factors associated with adoption decisions and the relationships between them. Moreover, with few exceptions, the existing literature tends to overlook the knowledge accumulated in the field of management information systems (MIS) with regard to the adoption of innovations such as new information technology. One important contribution of the MIS

literature to the understanding of adoption is the technology acceptance model (TAM) developed by Davis (1989) and later extended by Venkatesh & Davis (2000).

The existing body of knowledge also lacks service-specific details. Most of the scholarly research in this area tends to look at information as one broad category and transactions as another. Service-specific analysis may reveal the variations among services that are masked by a broad category. Online transactions with government are another area that does not receive enough scholarly attention, including transactions with businesses. Although conducting transactions online is viewed as the indication of reaching a more advanced stage of e-government, its practical significance has not translated into sufficient attention from the research community.

In sum, this paper advances the study of the adoption of e-government in several ways. First, it looks at the less researched business community that conducts various transactions with government and constitutes a major source of revenue for e-government projects. Second, it employs rigorous analysis in a theoretical framework focused on provision of service-specific online adoption. Lastly, the results shed light on larger regarding adoption of online transactions.

## **BUSINESS ADOPTION OF E-TRANSACTIONS WITH GOVERNMENT**

### ***Theoretical Perspectives***

The technology acceptance model (TAM) developed by Davis (1989) is a useful theoretical perspective for understanding the primary factors shaping the intention to use online services. The primary unit of analysis is the individual and his or her adoption of organizational software. The model identifies perceived usefulness and perceived ease of use as the two primary factors shaping intention to use. According to Venkatesh and

Davis (2000, p. 187), perceived usefulness is “the extent to which a person believes that using the system will enhance his or her job performance.” Perceived ease of use captures the user’s perception of whether using a particular system is free of effort. This model has been validated by the studies of the adoption of information and communication technologies such as word-processing, spreadsheet, and e-mail applications (Chua, 1996; Jackson et al., 1997), as well as the adoption of electronic commerce (Gefen, 2001; Gefen et al, 2003). Perceived usefulness and ease of use have been established as two key factors in shaping individuals’ intention to use new technologies. Both factors are positively associated with intention to use and actual adoption. A recent effort to apply the model to the adoption of online government information and services by citizens reinforces this notion (Carter & Belanger, 2004).

Whether these two factors of the TAM are significant in organizational adoption of electronic government services remains to be tested. Businesses as a whole may be different from individuals in making adoption decisions. The use of electronic services on government portals may entail a different set of incentives than those presented by software or information systems used by individuals inside an organization. Moreover, businesses, given their profit-maximizing goals, may act differently from citizens or governments. This study will attempt to see whether that is the case.

The other theoretical perspective is the adoption and diffusion of innovation as articulated in Rogers (2003). Since innovation is broadly defined as an object or idea perceived to be novel (Rogers, 2003), online government information and services with their novelty can be conceptualized as innovations. This study’s focus on adoption leads

us to explore the characteristics of innovations rather than the social system and communication channels that are more associated with diffusion.

Tornatzky & Klein (1982), in their meta-analysis of research on the adoption of innovations, have identified three main characteristics of innovations that are positively associated with adoption: relative advantage, compatibility, and complexity. Relative advantage captures the gain from adopting new practices in comparison with continuing the existing practice. The gain can be more than tangible, economic benefits (Rogers, 1995, p. 15). This definition expands the limited scope of perceived usefulness in the TAM, which defined it as improvement in job performance. At the organizational level, it can be a host of benefits that determine its adoption decision, ranging from cost savings and convenience to even social prestige. Relative advantage is a matter of perception, which is consistent with the TAM's emphasis on perception.

Compatibility measures the degree to which an innovation is perceived as compatible with the adopter's past experiences, values, and needs. Low compatibility can mean an innovation runs against a standard practice. As a result, the learning curve is rather steep and resistance to innovation adoption is high. This entails a set of risks perceived by the adopter as associated with the innovation. Particular risk items are determined by the nature of each innovation.

Complexity measures the difficulty involved in understanding and using an innovation. The notion of complexity speaks to perceived ease of use in the TAM, while measuring the same concept in a different direction. Both theoretical lenses emphasize perception and difficulty in using the innovation. Characteristics of adopters play an important role in determining the perception of complexity. For instance, the level of

technical competence of an individual is likely to shape his or her perception of system complexity. A limited knowledge of computers may make learning a new information system difficult.

Nonetheless, whether these insights of innovation adoption are applicable to businesses as organizational adopters remains to be seen. We next discuss the applicability to businesses of these insights from both theoretical perspectives. The discussion will form the basis for developing our hypotheses.

### ***Factors Driving Business Adoption***

The concept of perceived benefits captures both perceived usefulness beyond job performance as usually defined by the TAM, and the notion of relative advantage articulated in the diffusion of innovations literature. Since our study focuses on organizations as the adopter, the notion of usefulness needs to be expanded to include cost savings and other organizational benefits. For citizens, the adoption of government information and services online is driven by economic as well as social reasons. In contrast, businesses are primarily motivated by economic benefits.

Perceived benefits of online transactions are relative to the existing practice of transacting with government via traditional channels such as phone, mail, or office visits. One way to address the relativity is to specify the additional benefit of utilizing an online channel, including the convenience of no-waiting, conducting the transaction at any location, and the speed of the overall transaction.

Perceived costs embody complexity. For businesses, complexity engenders cost because time is money. For a business, online transactions involve several steps. It will first start with establishing an Internet connection, finding the right website to conduct

transactions, working through the process by reading the instructions, and completing the transactions. Each step constitutes a cost item in the full accounting of costs associated with a particular transaction.

Costs are a matter of perception. According to the adoption literature, costs should be defined in a relative term as suggested by the notion of relative advantage. Different companies may assign different weights to the cost of transacting with government online. The costs should be measured in relation to off-line methods. Online adoption will seem rational for the organization only if the online method is easier than the paper-based method. For example, the additional risks and costs may include the loss of proprietary or credit card information online. Another source of frustration that businesses may have is not being able to ask questions when conducting transaction with government online. Some of them are used to having the convenience of live chat on some e-commerce Web sites to get questions answered. The discussion about perceived benefits and risks leads us to hypothesize that:

H1: Perceived relative benefits are positively associated with a firm's intention to adopt online government transactions.

H2: Perceived relative costs are negatively associated with a firm's intention to adopt online government transactions.

Conducting transactions online involves a certain level of trust. When trust is institution-based, individuals determine the trustworthiness of a transaction based on the structure and regulations governing it (McKnight et al., 2002). Government agencies with a reputation for safeguarding business information are likely to win the trust of those businesses transacting with them. A responsible government agency is likely to have a

policy statement on the use and disclosure of business information. The lack of public disclosure of such policy may raise concerns about how proprietary and confidential information is stored and protected. The discussion about trust leads us to hypothesize:

H3: A high level of trust is positively associated with a firm's intention to adopt online government transactions.

The characteristics of people or organizations also shape their adoption decisions. Citizens who tend to interact with government online fit a profile; they tend to be middle-aged (Thomas & Streib, 2003), affluent (Gibson, 2002; Horrigan, 2004; Mossberger et al., 2003), and well-educated (Larsen & Rainie, 2002, p.16). These factors seem to measure an underlying capacity of the individual to engage with government online. Organizational absorptive capacity is a strong predictor of an organization's ability to adopt innovations (Cohen & Levinthal, 1990). Since the focus of our research is firms, organizational capacity is pertinent. To conduct online transactions with government, businesses at minimum need to have proper and reliable internet connections. In addition, they need to have staff time and other resources to initiate and complete a business transaction with government. Larger firms are more likely to have the staff and other resources than smaller firms. We thus hypothesize that:

H4: The capacity to conduct online transaction is positively associated with a firm's intention to adopt online government transactions.

## **METHODS AND DATA**

This study tests the four hypotheses with a statewide survey of businesses in the state of Iowa. There has not been any systematic study of business adoption of online government

information and services since 1999.<sup>2</sup> There are eight industry groups based on the Standard Industrial Classification (SIC). The service industry group constitutes almost half (47%) of the total number of businesses in Iowa. Retail trade ranks next, with 19 percent, followed by financial service businesses with 9 percent. Construction, wholesale, and manufacturing have similar representation, at 7, 6, and 5 percent, respectively. Transportation (4 percent) and agriculture (3 percent) have the smallest number of businesses compared to other SIC groups. Most businesses in Iowa are small in terms of number of employees. About 63 percent of businesses have 1-4 employees. About 80 percent of businesses employ ten or less persons, 9 percent employ 10-19 persons, and 7 percent employ 20-49 persons. Only 4 percent of businesses employ 50 or more persons.

### ***Sampling and Data Collection***

The project began with a comprehensive review of 46 Iowa state government Web sites to determine a reliable list of electronic government services currently offered to Iowa firms. Researchers worked with the Center for Survey Statistics & Methodology at Iowa State University to develop a telephone questionnaire for the survey. Pilot interviews were conducted with six local business representatives to pretest the survey for any troublesome items and adjustments were made to the questionnaire based on the pretest. The survey center produced a stratified random sample of 800 firms from about 149,000 Iowa firms that were identified using the 2004-2005 edition of DirectoriesUSA's Iowa Business Directory. The sample is stratified by Standard Industrial Classification (SIC) code groups and by number of employees, to be representative of the business profile in Iowa. The sample of firms included non-profit organizations as well as for-profit firms,

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<sup>2</sup> For the report on business demand for e-government in 1999, see Momentum Research Group, Cunningham Communication Commission (2000).

since both types of establishments would have contact with state offices and agencies. In some cases the sample also included multiple locations for the same business. We attempted to gather information one time for the business as a whole and recorded secondary locations as ineligible.

Advance letters were sent to firms identified in the sample to explain about the project and to inform them that an interviewer would try to contact them shortly. Standard interviewing protocols were followed by survey center staff throughout the project. Computer-aided Telephone Interview (CATI) software was programmed to include edit checks to detect illegal values and logic errors as responses were entered into the computer during the interview. Data retrieval callbacks were made to the respondent by the original interviewer or supervisor when required. Basic frequencies and cross tabulations were analyzed to catch entry or coding errors, and corrections were made as needed. The interviews were 15 to 20 minutes in length. A total of 800 calls were made resulting in 432 completed telephone surveys, for an overall response rate of 57%. Reported sample percentages are statistically valid within  $\pm 5\%$  at the 95% confidence level.

### ***Operationalization of Dependent and Independent Variables***

The dependent variables measure the intention of a firm to adopt online versions of four specific kinds of services that the firm currently conducts with state agencies using traditional channels and could conduct online in the future. The four kinds of services are represented by the four dependent variables presented in table 1.

[Insert Table 1 Here]

The survey questions are branched in a way to make sure that responses from businesses are based on concrete and specific experiences. As a result, the responses will be a better reflection of actual decision making, increasing measurement reliability. Having well-defined elements is critical in soliciting a choice or opinion, as demonstrated by the scholars attempting to seek an assessment of value (Portney, 1994, pp. 5-6). Hanemann (1994, p. 22) also argues that details matter to assure reliability of results. This survey takes into account the fact that not all services are relevant to a responding business.

Firms were first asked whether they conducted each of the particular kinds of transactions listed in table 1.<sup>3</sup> Firms were then asked whether they conducted this transaction online. If they did not, they were asked: “Would you like to be able to do this on-line in the future?” The answer to this question (Yes=1, No=0) is the operationalization of the intention of future adoption. The sequencing of questions takes advantage of the anchoring effect of a specific kind of transaction. Respondents were able to indicate their intention of future adoption when the services in question were fresh in their minds.

The independent variables capture the theoretical arguments for the intention of future adoption (table 2). Three proxies are used to capture perceived benefits relative to the use of conventional methods of transactions. The speed of an online transaction embodies the immediate nature of completing the transaction and getting a confirmation. Performing a transaction from any location reflects the relative benefit of the online method to office visits. For small businesses, it also means that the business owners can conduct transactions at home. The convenience of no waiting refers to the benefit of

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<sup>3</sup> Firms that used an intermediary for the transaction were excluded from further questions. Intermediaries include law firms and accounting firms that perform services for other businesses.

avoiding any delay as the result of sending mail and waiting for a response in the mail, shortening the time required for getting a permit from weeks to days.

Perceived costs are captured in possible obstacles such as no person-to-person contact during online transactions and the concern about the quality of information posted online. No person-to-person contact is a cost born by those businesses transacting online relative to conducting the transaction by phone or office visit. Those businesses are not able to get their questions answered by a person. Quality of information is another perceived cost. Business transactions depend on the accuracy of information. Errors in the information provided online are likely to have financial consequences.

Concerns about privacy refer to the potential loss of proprietary or confidential business information during a transaction. A high level of concerns about privacy translates into low trust. Providing an electronic signature is usually the last step involved in authenticating an official document submitted online. It is a test of the extent to which a business trusts an online transaction. For businesses, capacity is often a matter of size. The number of employees is used as a proxy of size. Large companies are likely to have more transactions with government. As a result, they can achieve economies of scale in transacting online. Another dimension of capacity is information technology capacity as measured by the type of internet access. Broadband internet access is more conducive for conducting complex business transactions online that require a reliable and fast connection.

[Insert Table 2 Here]

## ANALYSIS AND RESULTS

Four logistic regression models were produced using the set of independent variables with each of the dependent variables (table 3).<sup>4</sup> As these are logistic coefficients, the interpretation of the results for a particular variable can be generally seen as positively or negatively affecting the dependent variable. The specific interpretation of affects of the independent variables on intention to adopt is based on an interpretation of the odds ratio for each variable. Given the ordinal nature of most of the independent variables in this model, such specific interpretation is still difficult. Thus, we only report the general interpretation below.

[Insert Table 3 Here]

The results of the logistic regressions suggest that perceived benefits play a significant role in the decision of firms to adopt online transaction channels with state agencies (H1), in contrast to perceived costs (H2) which did not seem to affect adoption intentions. As seen in model 2, the perceived benefits of the convenience of doing online transactions “from any location” and the “convenience of no waiting” for online transactions are statistically significant factors in the intention to adopt online application for or renewal of any state permit.<sup>5</sup> Similarly, the intention to adopt bidding for state contracts or registering a company, or registering company vehicles with the state is influenced by the perceived benefit of the convenience of doing online transactions “from any location” (model 4). Thus, firms that perceive higher benefits of not waiting for the

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<sup>4</sup> We also checked for multicollinearity of all four logistic models. We ran each of the four models using ordinary least square regression, and checked the tolerance collinearity statistics for every variable. According to Menard (1995, p. 66), a tolerance score of 0.2 or below is a sign of concern. Since all tolerance scores are above 0.3 for all variables in all four models, we conclude that multicollinearity is not a concern.

<sup>5</sup> Given the exploratory nature of this research, we set our probability acceptance at  $p \leq 0.10$ . We report the actual probabilities so that the reader can make their own judgment about statistical significance.

online transaction and conducting the online transaction from any location are more likely to intend to adopt the online channel to apply for and renew state permits than firms with lower perceived benefits.

Model 3 provides support for the affect of both perceived benefits (H1) and trust (H3) on adoption of online transactions. Both the perceived benefit of not waiting for online transactions (NOWAIT) and a higher comfort level with electronic signatures (E-SIG) positively influence the intention to adopt the online version of applications for or renewal of professional licenses or certifications. Thus, firms that perceive higher benefits of not waiting for the online transaction and have a higher comfort level with e-signatures are more likely to intend to adopt the online channel to apply for and renew state licenses than firms that perceive lower benefits and are less comfortable with e-signatures.

Finally, model 1 provides weak support for H4, the hypothesis regarding the capacity to conduct online transaction as positively affecting a firm's intention to adopt online government transactions. Employment size (EMPLOY) was the only significant variable in model 1, and the coefficient is only marginally significant. Larger firms are more likely to intend to adopt the online channel to file reports or claims with the state than smaller firms.

## **DISCUSSION AND CONCLUSION**

The findings generally comport with the relationships as predicted based on the technology acceptance model (TAM) and adoption of innovations literature. Perceived benefits are a strong predictor of the intention to adopt online transactions with government, supporting the first hypothesis. The convenience of conducting transactions

from any locations and not waiting in line has a significant positive relationship with the intention to adopt. This is particularly the case for getting permits online. At least one of the two kinds of benefits registers as significant in getting professional license online or registration for bidding or commercial vehicles.

The results provide initial evidence that trust plays a role in shaping a firm's intention to adopt online transactions with government (H3). A higher comfort level of using an electronic signature is an indication of trust in the process, and it is significant for the application and/or renewal of professional licenses. Interestingly, concern about privacy does not constitute a significant issue on trust. One explanation is that firms have a long history of giving their information to government. For them, reporting to government or giving company specific information is a routine matter. As a result, privacy is probably not a main concern. In contrast, citizens may perceive privacy to be more of a barrier.

Interestingly, we found no support for H2, the hypothesis that perceived costs would negatively affect the intention to adopt online transactions. Perceived costs did not show a statistically significant association with the intention to adopt. Neither a perceived lack of person-to-person contact (NOPERS) nor the quality of information provided online (QUALITY) were significant factors in any of the models. The lack of person-to-person contact in resolving problems with transactions does not appear to have a significant bearing on the intention to adopt. It could be that online transactions usually provide sufficient help to businesses in navigating through the process. Therefore, it is no longer an issue for those businesses.

There is only weak support for H4, as measured by number of employees; it is only a significant factor for the intention to adopt filing forms and reports, perhaps because an increase in the size of a business requires more reporting requirements and filing forms with government. One explanation for the general lack of importance of the employment size variable across the models is that it does not adequately capture the capacity construct; in the future, we will experiment with using gross sales or other traits of firms to measure this concept. Neither was the type of online access (ACCESS), another firm capacity variable, a significant variable in any model. We suspect that the high rate of broadband access among the firms in the sample (75 percent) renders the variable insignificant, especially compared to the other barriers and benefits. Type of industry may matter because each industry has its unique business needs. Including type of industry in future analysis may reveal some interesting relationships.

These results present several policy implications. First, the hype regarding the speed of online transactions is not justified by these results. Flexibility and convenience are more important (location and no waiting in line). While convenience is perhaps theoretically related to the overall speed of the transaction, our collinearity diagnostics revealed no statistical problem. We conclude that firms are focused on the overall convenience of these transactions, and state agencies developing online transactions channels for business services should approach the project with a holistic focus on convenience, not just the faster online transaction timing. The results suggest that firms want service on demand (no waiting), i.e., services on the customer's terms, not the bureaucrats'. This may require agencies to reengineer these service delivery processes, a

requirement that marks the third stage of e-government evolution (Ho, 2002; Layne & Lee, 2001).

Second, these results suggest that state governments can increase the likelihood of firms adopting online channels for transactions by improving the comfort level of firms regarding e-signatures and other components of online business transactions. Firms that trust the transaction process are more likely to use the online channel; it would be especially important to reassure firms applying for and renewing license applications and other critical requirements for the conduct of their business.

We also recognize the limitations of this study. The main tradeoff in this study is made between getting a more accurate measure of adoption intention and the number of businesses studied. Focusing attention only those who have not conducted a particular kind of online transactions with state government has the benefit of allowing us to gauge their intention to adopt more accurately because the intention is related to that type of transactions. In the process, the interviewers did not force subjects to make up a response to a question about future adoption if they are already adopters. They also excluded those who use intermediaries such as law and accounting firms (who may themselves use online channels for their clients, as is often the case for filing UCC (uniform commercial code) registrations with Secretary of State office). As a result, we could get at only the non-adopters and ask them about their intention. However, the tradeoff is the reduction in sample size. Sifting the sample for those who conduct specific types of transactions quickly reduces a sample of 400 to just over 100. Such a technique substantially increases the cost of each valid response for these regression equations. Again on the positive side,

we believe these results have stronger validity and reliability than without such sifting, and therefore are more confident in their generalizability to other states.

This study is one of the first studies to look at firms and actual transactions online. Therefore, these results are exploratory in nature and require further research. At a minimum, our study is an important first step in developing a testable framework for conducting a comparative or national study. We expect that extending this line of inquiry beyond a single state to a region or the nation will be a fruitful research direction. We encourage researchers to utilize the model presented in this study and see if the findings are consistent across state lines.

**Table 1**  
**Dependent Variables: Types of Business Transactions with State Agencies**

FILING: filing any reports or claims with the state, such as UCC filing, unemployment, or wage reports. Additional examples include Quarterly worker's compensation reports, industrial insurance quarterly reports, corporate document ordering, worker's compensation claims filing, legal filings, waivers.
PERMITS: application for or renewal of any state permits, such as building permits, health permits, operational permits, electrical inspection permits, overweight vehicle permits.
LICENSES: application for or renewal of any professional licenses or certifications, such as appraiser licenses or certification for agricultural products; fruit, vegetable, grain, seed certification, nursing licenses.
BIDDING: bidding for state contracts, registering company, or registering company vehicles with the state such as registration as a state contractor, submission of bids for proposals, registration of commercial or fleet vehicles.

**Table 2**  
**Operationalization of Independent Variables**

<i>Independent Variables</i>	<i>Operationalization</i>
<b><i>Perceived Benefits</i></b>	
SPEED	Rating on the importance of “The speed of online transactions “ as a benefit of using online government services (Scale of 1-5)
LOCATION	Rating on the importance of “The convenience of doing the transaction from any location“ as a benefit of using online government services (Scale of 1-5)
NOWAIT	Rating on the importance of “The convenience of no waiting“ as a benefit of using online government services (Scale of 1-5)
<b><i>Perceived Costs</i></b>	
NOPERS	No person-to-person contact online is an obstacle for your company to use online government services. (1=Yes, 0=No)
QUALITY	The quality of the information provided online is an obstacle for your company to use online government services. (1=Yes, 0=No)
<b><i>Trust in Online Transactions</i></b>	
E-SIG	Rating on the comfort level of using an electronic signature on an important document (Scale of 1-5; 1=not comfortable at all and 5= very comfortable with it).
PRIVACY	Privacy concerns constitute an obstacle for your company to use online government services. (1=Yes, 0=No)
<b><i>Organizational Capacity</i></b>	
EMPLOY	Number of Employees
ACCESS	Type of Internet access (1=broadband, 0=dial-up)

**Table 3**  
**Logistic Regression Results for Intent to Adopt Specific Online Transactions**

<b>Variables</b>	<b>Model 1: FILING</b>	<b>Model 2: PERMITS</b>	<b>Model 3: LICENSES</b>	<b>Model 4: BIDDING</b>
SPEED	0.236 (0.441)	-0.381 (0.282)	-0.057 (0.867)	-0.151 (0.637)
LOCATION	0.161 (0.468)	0.458 (0.039)**	0.056 (0.792)	0.388 (0.069)*
NOWAIT	0.303 (0.358)	0.601 (0.094)*	0.919 (0.008)***	0.468 (0.223)
NOPERS	-0.770 (0.164)	-0.933 (0.139)	-0.585 (0.287)	0.498 (0.407)
QUALITY	0.871 (0.195)	0.086 (0.892)	0.505 (0.385)	1.143 (0.182)
E-SIG	-0.018 (0.928)	0.235 (0.288)	0.318 (0.087)*	0.246 (0.247)
PRIVACY	-0.173 (0.772)	-0.391 (0.499)	0.229 (0.672)	-0.662 (0.302)
EMPLOY	0.042 (0.090)*	0.014 (0.221)	0.007 (0.432)	0.002 (0.573)
ACCESS	0.585 (0.382)	0.558 (0.385)	0.441 (0.466)	0.029 (0.967)
Goodness of Fit (Nagelkerke R-Square)	0.354	0.413	0.404	0.32
Number of Observations	114	118	129	91

Notes: probability values are in parentheses. \*,  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$   
 Odd ratios are reported in italics for those variables that are significant.

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